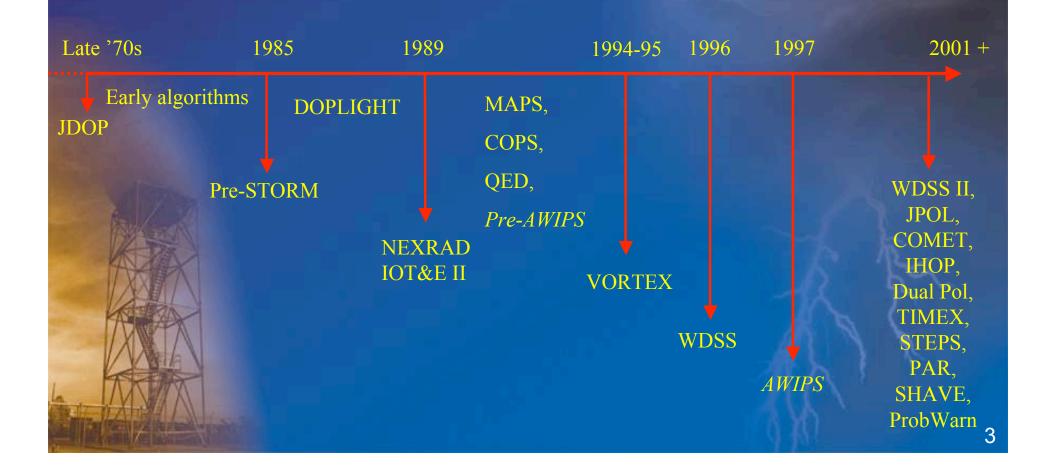
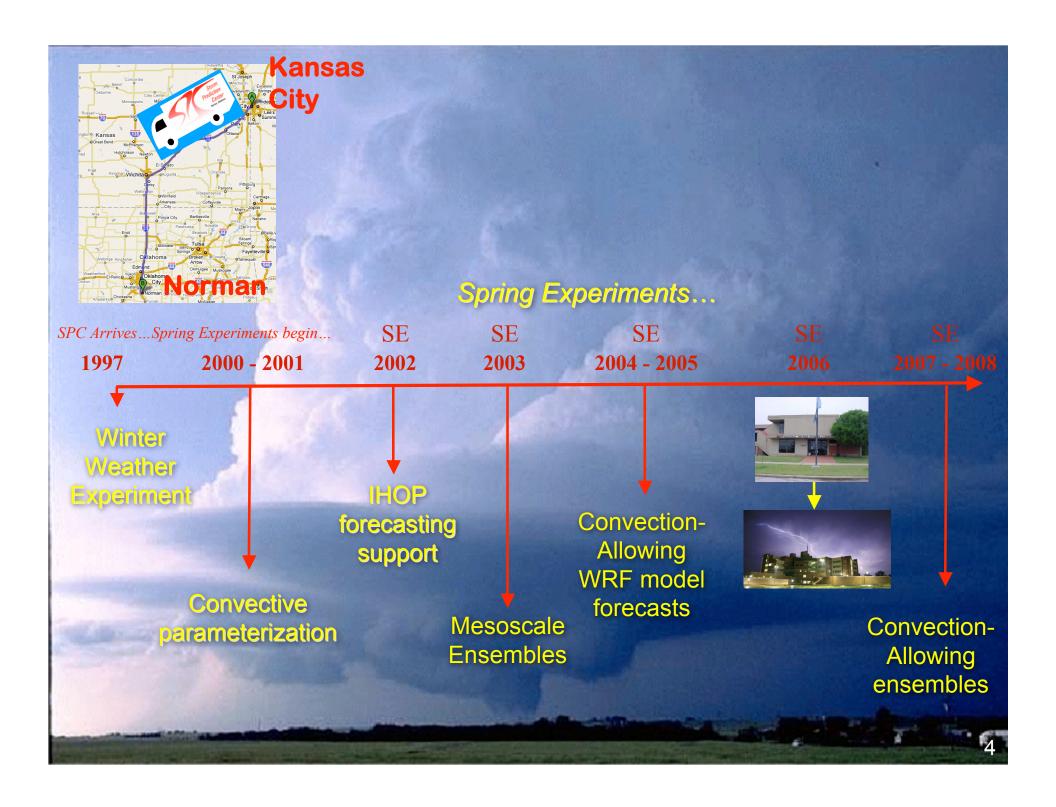


## Establishing the "Culture of Collaboration"

A glance at pioneering Collaborative Projects between NSSL and the local NWS forecast office (WFO-OUN)







Building a collaboration from day 1... NSSL made room in their building for the SPC....





-Within days a joint experimental forecasting exercise ("WINWEX") was initiated to help SPC forecasters prepare for new operational forecasting responsibilities related to winter weather.



- Soon thereafter, daily map discussions were started — not a weather briefing but a focused discussion using daily weather to explore areas of mutual interest between researchers and forecasters.



#### Pubs:

 Papers on precip-type and the melting effect, freezing rain climatology.

### Ops:

 New operational forecast product – winter weather Mesoscale Discussion.

## Intangibles:

New working relationships, new ideas for operationally relevant research



# The second Spring Experiment (2001)



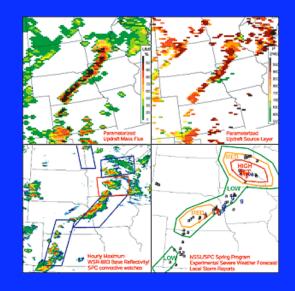
-Participants: SPC Forecasters, NSSL scientists +

- 5 FSL scientists
- -2 NCEP/EMC scientists
- -4 forecasters from WFO/OUN
- 2 scientists from academia





- -Topics of investigation:
- Model fcsts of convective initiation and evolution
- -Method of investigation.
  - Subjective verif., quantitative assessments (1/2 day)
  - Experimental forecasting exercises (hand analysis!) in a simulated operational forecasting environment



#### Pubs:

 At least 4 directly related pubs...e.g., Reviewer B: "Hopefully every operational forecaster that uses the Eta model will have the opportunity to read your paper."

#### Ops:

- KF convective parameterization implemented at NCEP/EMC
- Diagnostic versions of KF and BMJ schemes implemented in workstation sounding diagnostic package
- A new working paradigm:
  - Take participants out of their comfort zone: Scientists become forecasters, Forecasters become scientists
- Very favorable feedback, valuable suggestions from external participants



# Spring Experiment 2003: Mesoscale Ensembles



-47 Participants: SPC Forecasters, NSSL scientists +

- •FSL
- ■NWS: NCEP/EMC, NIFC, WFO-OUN, WFO-DTX
- Academia: OU, UW, PSU, ISU, MIT
- ■UCAR: COMET
- International: Met. Services Canada, UK Met Office
- Private Sector: Koch/Entergy Corp.



#### -Topics of investigation:

- NCEP SREF applications to severe convection forecasting
- The human role in specifying ensemble perts

#### -Method of investigation:

- Subjective verif., quantitative assessments (1/2 day)
- Experimental forecasting exercises for severe convection



#### Pubs:

1 refereed pub, many conference papers

### Ops:

 A plethora (several hundred) of ensemble diagnostic tools developed and transferred to SPC Operations: SPC WCM - "SREF diagnostics have revolutionized the way we do Convective Outlooks"

### Intangibles:

 Broad range of participants (forecasters and researchers) provide very favorable feedback; the framework of the Spring Experiment appears to be quite effective...did someone say "Hazardous Weather Testbed??"



#### **Spring Experiments '04-'05:**

## Convection allowing model forecasts



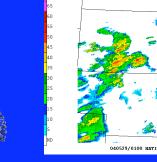


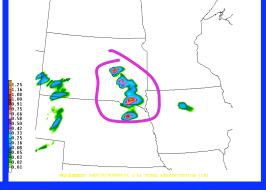
-50+ Participants from a broad range of research, forecasting, and academic organizations.



#### *-Topics of investigation:*

• Convection-allowing model forecasts (CAMs) from WRF-ARW and WRF-NMM dynamic/physics cores.









#### Research:

- Multiple pubs
- New insight into possibilities of CAMs

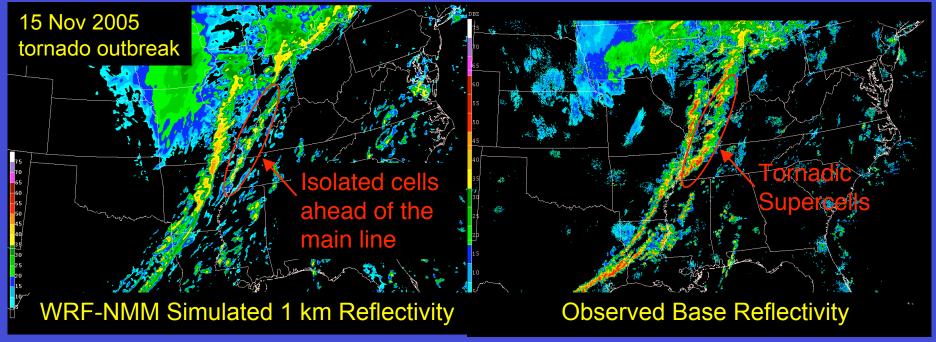
#### Ops:

- Broad enthusiasm for "simulated reflectivity" product
- NCEP vision for opnI production suite changed to include convection-allowing configurations
- How to use these models in an operational sense at SPC "storms not necessarily in right place but we can get useful information from these models [mode and evolution]"... "A turning point in the use of model output"

#### Intangibles:

 Strengths and weaknesses of various WRF configurations identified, communicated to NCEP/EMC and NCAR scientists

# Convection-allowing forecasts: Operational Impacts





"The WRF-NMM4 provided very useful input regarding the mesoscale organization and character of storms...I used it to help delineate where/when watches would be required." *John Hart - SPC Day Shift Lead Forecaster* 



# 2006: Move to the National Weather Center - creation of an HWT facility











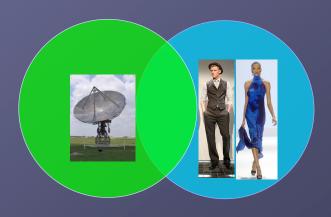


## NOAA Hazardous Weather Testbed



- A unique forum for collaboration between researchers and practitioners...

Experimental
Warning
Program



Experimental
Forecast
Program



#### **EFP Spring Experiments '07-'08:**

Convection allowing model forecasts – ensembles and deterministic forecasts





-50+ Participants from a broad range of research, forecasting, and academic organizations.



#### -Topics of investigation:

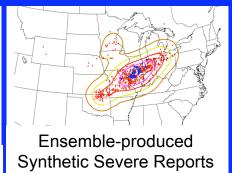
• potential uses of CAM ensembles and unique output fields from deterministic CAMs







**Observed Severe Reports** 





#### **HWT-EFP Spring Experiment 2007 Participating Institutions:**

#### **NOAA Agencies**

- NWS/OUN

- NWS/RAP

- NWS/SLC

- NWS/SRH

- OAR/PSD

- OAR/NSSL (5)

- OAR/GSD (3)

- NCEP/AWC (2)
- NCEP/EMC (3)
- NCEP/HPC
- NCEP/SPC (9)
- NWS/BTV
- NWS/LWX
- NWS/MAF
- NWS/OCWWS

#### Universities

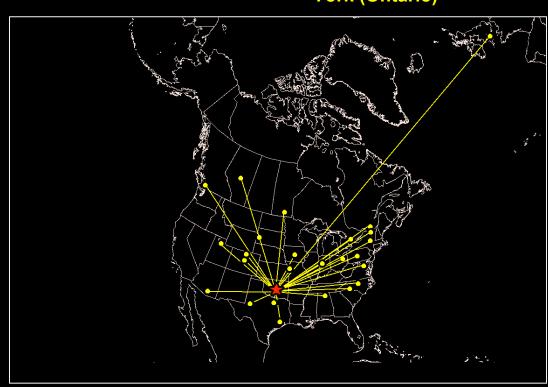
- Albany-SUNY (2)
- Arizona (2)
- Colorado State
- Iowa State
- North Carolina State (4)
- Oklahoma (2)
- Penn State
- Purdue (2)
  - UNC-Charlotte
  - York (Ontario)

#### **Gov't Agencies**

- NCAR (5)
- Environ. Canada (6)
- UK Met Office
- USRA (Huntsville)

#### **Private Sector**

- Merrill Lynch
- FirstEnergy



# The 2008-'09 HWT-EWP Experiments

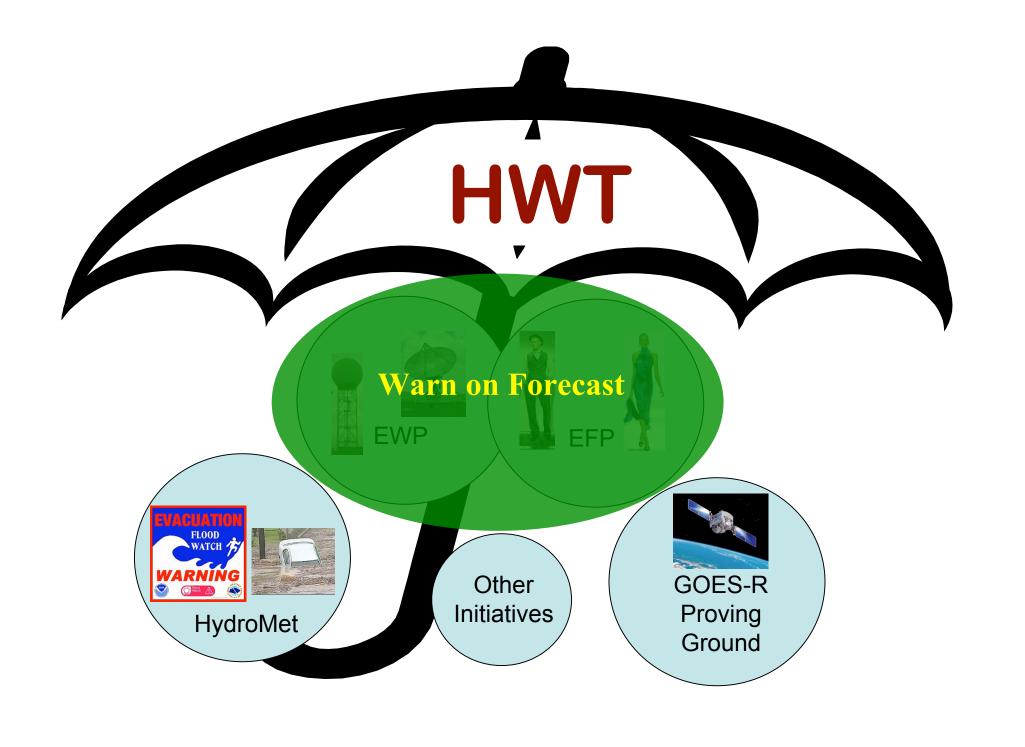


- Phased-Array Radar (PAR)
- Collaborative Adaptive Sensing of the Atmosphere (CASA)
- Gridded Probabilistic Hazard Information (PHI)
- WDSSII Multiple-Radar/Sensor algorithms
- 3D Lightning Mapping Array (LMA)

## What is the HWT?

• A "chartered" testbed...a paradigm for interaction between research and operational meteorologists focusing on severe weather

 A facility, strategically located between two NWS operational forecasting centers and NSSL applied research offices



## Keys to success - institutional

- Dedicated scientists, forecasters, managers
- Dedicated, generous partners: e.g., AFWA, CAPS, NCEP/EMC, GSD, NCAR, NASA-SPORT
- "drinking from the same coffee pot" shared building space in the old NSSL building and the new NWC

## Keys to enthusiasm

- Organizers have:
  - Vested interest in success from scientific and/or operational forecasting perspectives
  - Complementary skills
- Shared experiences: All participants experience the challenge (and humiliation) of forecasting severe convection and verifying their forecasts.
- The inherent urgency of today's weather: CONUS scale domain encompasses interesting weather, challenging forecasts every day